Fundamentals of unsaturated soil mechanics and recent experimental developments

Expansive soils experience significant volume changes upon water content changes (wetting or drying). Such soils are problematic for buildings or infrastructure, such as roads or railways, because of the large ground movements and/or pressures generated. Adequate design of such engineered structures requires experimental characterization of expansive soils and their swelling potential, which is only possible with advanced and reliable testing techniques. This presentation will cover some fundamental aspects of unsaturated soil mechanics, a framework in which expansive soils are commonly studied, before elaborating on recent experimental developments achieved at the University of Newcastle to test expansive soils. Then, some results on the swelling response of expansive soils will be briefly presented.

Olivier Buzzi

Dr. Olivier Buzzi graduated from the Ecole Normale Superieure de Cachan, one of the most prestigious and competitive public institutions of higher education and research in France. After ranking second nationally at the French National Agrégation of Civil Engineering in 2000, he successfully completed a Master on rock joints (in 2001) and PhD on the hydromechanical behaviour of contacts between geomaterials in the context of nuclear waste storage (completed in 2004).

Moving to Australia from his home in France in 2005 to take up the position of a post-doctoral researcher was the first step in Dr Olivier Buzzi's career at the University of Newcastle. He began lecturing at the University in 2007, became a senior lecturer in 2009, an Associate Professor in 2012, and has cemented his position as a chief investigator with the ARC Centre of Excellence for Geotechnical Science Engineering.

With research interests in rock mechanics, rock joints, expansive soils and unsaturated soil mechanics, Dr Buzzi has received several large research grants to investigate areas including strategies to extinguish underground coal fires and to extract geothermal energy; microstructure-based computational homogenisation of geomaterials; and barriers for cost-effective rock fall hazard mitigation.

Dr Buzzi is an Editorial Board member of Computers and Geotechnics and Rock Mechanics and Rock Engineering and an Associate Editor of the Canadian Geotechnical Journal, three highly recognised journals of the field.